AMENDMENTS TO THE SPECIFICATION

Please replace the following paragraphs:

Page 1, line 19 to page 2, line 3.

A1

System designers can distribute PCI interrupts based on the topology of the fixed devices soldered down on the motherboard, such as integrated video and an integrated network interface, to assure that interrupts (IRQ's) are distributed evenly across such devices. However, designers can neither control nor predict which PCI expansion slots will be populated with devices by the user or others This often results in an inefficient interrupt (IRQ) distribution among the devices plugged into expansion slots whereby some interrupts carry a larger burden than other interrupts. While in such a system, if many devices are assigned to a particular sharable interrupt, the system will still function, <u>although</u> significant delays will be experienced while the system polls to see from which particular device the shared interrupt originated.

Page 3, line 6 to page 3, line 21.

A2

FIG. 1 is a block diagram showing an <u>embodiment of an</u> information handling system employing a conventional interrupt assignment arrangement.

FIG. 2 is a block diagram showing the disclosed information handling system which employs improved interrupt assignment and sharing.

requests to share a common interrupt with a device which generates a lower number of interrupts.

Brief Description of the Drawings

FIG. 1 is a block diagram showing an information handling system employing a conventional interrupt assignment arrangement.

FIG. 2 is a block diagram showing the disclosed information handling system which employs improved interrupt assignment and sharing.

FIG. 3 is a block diagram showing another embodiment of the disclosed information handling system which employs improved interrupt assignment and sharing.

Sub A2

FIG. 4 is a flowchart depicting the operation of a dynamic router in the information handling system of FIG. 3.

Fig. 5 is a block diagram showing multiplexer logic for selectively connecting or assigning devices such as a network interface card (NIC) to different interrupt lines.

Detailed Description

FIG. 1 depicts a conventional information handling system 100 such as a computer system, for example. An information handling system is defined as an instrumentality or aggregate of instrumentalities primarily designed to compute, classify, process, transmit, receive, retrieve, originate, switch, store, display, manifest, detect, record, reproduce, handle, or utilize any form of information, intelligence or data for business, scientific, control or other purposes.

FIG. 3 is a block diagram showing another embodiment of the disclosed information handling system which employs improved interrupt assignment and sharing.

FIG. 4 is a flowchart depicting the operation of a dynamic router in the information handling system of FIG. 3.

A2

Fig. 5 is a block diagram showing an embodiment of multiplexer logic for selectively connecting or assigning devices such as a network interface card (NIC) to different interrupt lines.

Page 5, line 6 to page 5, line 16.

A3

Returning now to the example wherein interrupts INT A and INT B are already assigned to fixed devices NIC 140 and video controller 145, respectively, if the slot 1 device requests interrupt A, then INT A is assigned to the slot 1 device. Thus, NIC 140 and the slot 1 device will share INT A. If a slot 2 device should request interrupt B, then INT B is assigned to the slot 2 device. In this case, on-board video controller 145 and the slot 2 device share INT B. If slot 3 is now populated with an expansion card and that card requests interrupt C, then INT C is assigned to the slot 3 device. In this scenario, only the slot 3 ~~devices~~ device has a unique interrupt, namely INT C. The remaining slot 1 and slot 2 devices must share interrupts with the on-board devices. Stated alternatively, INT A and INT B are shared while INT C is not shared and INT D remains unused.

PATENT
Docket No.: 16356. 668 (DC-03278)
Customer No.: 000027683

Page 6, line 22 to page 6, line 26.

A4

Dynamic router 305 is conveniently implemented as a programmable gate array which is programmed to carry out the interrupt reassignment methodology described in the flow chart of FIG. 4. (Dynamic router 205 of FIG. 2 is similarly programmed as compared to dynamic router 305 of FIG. 3, but dynamic router 205 need only manipulate the interrupts associated with slots 1 – 3~~.~~).

Page 8, line 13 to page 8, line 23.

A5

This internal IRQ routing table is to be distinguished from three external tables that are presented to various operating systems as described subsequently. These external tables are a formal presentation of the final IRQ – device mapping to the operating system.~~.~~ In actual practice, 3 external routing tables are updated. More specifically, a Windows 98 IRQ routing table is updated for Windows 98 based systems; the MP table is updated to satisfy Windows NT 4 based systems and the ACPI tables are updated to satisfy Windows XP and Windows 2000 based systems~~.~~, (Windows is a registered trademark of Microsoft Corporation~~.~~). All three of these tables are updated because it is not known which particular operating system the user will employ. Once step 420 is carried out, the interrupt allocation process is complete as indicated in block 425 and the operating system can now load.

Page 9, line 9 to page 9, line 29.

A6

A decision is made regarding with which other device a remaining unassigned device will share an interrupt. To accomplish this, dynamic router 305 examines the class codes of the IRQ generating devices to determine which IRQ generating device generates the least number of interrupts over time, as indicated in block 435

of the flow chart of FIG. 4. The remaining device without an interrupt assigned is then assigned the same interrupt as the lowest IRQ generating device as per block 440. That remaining device thus shares the interrupt with the lowest IRQ generating device. Alternatively, the remaining device could be assigned the same interrupt as a device which generates a relatively low number of interrupts, if not the absolute lowest. If still another device remains without an assigned interrupt, that device would be assigned to share the same interrupt as the second lowest interrupt generating device, or another relatively low interrupt generating device. Some devices are known to not share interrupts in a well-behaved fashion. Such ill-behaved devices are flagged in the interrupt table and assigned ~~there~~ their own unique interrupt whenever possible as per step 445. As per step 450, IRQ's are also assigned to devices which, although they may generate a relatively low number of IRQ's, they are a type of device which needs its interrupts serviced immediately or very fast. Such a device may require a uniquely assigned IRQ. Process flow then continues to block 420 at which the interrupt table is updated to reflect the IRQ assignments just made. Interrupt allocation is now complete and the operating system can load as per block 425.

Page 10, line 8 to page 10, line 18.

FIG. 5 is a high level diagram of circuitry that can be used to implement a dynamic router such as dynamic router 210 of FIG. 2. It will be recalled that dynamic router 210 couples NIC 140 to a selected one of interrupt lines A, B, C and D of interrupt controller 130 of FIG. 2. As seen in FIG. 5, dynamic router 210 includes a multiplexer 235 having an input 235A to which NIC 140 is coupled. Input 235A is the input of a one input, four output multiplexer 235. The four outputs of multiplexer 235, i.e. A, B, C and D are respectively coupled to the 4 inputs of interrupt controller 130, namely INT A, INT B, INT C and INT D. A steering signal is

A7 applied to steering input 235B to instruct multiplexer 235 as to which output of multiplexer 235 should be selected. In this manner, NIC 140 can be connected to and assigned to any one of interrupts A, B, C and D.

Page 11, line 9 to page 11, line 14.

A8 Although illustrative embodiments have been shown and described, a wide range of modification, change and substitution is contemplated in the foregoing disclosure and in some instances, some features of the ~~embodiment~~ embodiments may be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the embodiments disclosed herein.

Page 17, line 11 to page 17, line 18.

A9 An information handling system is provided which includes a dynamic interrupt router for balancing interrupt assignments among a plurality of devices requesting interrupt assignments. The system balances interrupt assignments among both fixed devices mounted on the processor board and interrupt assignments to devices situated in expansion slots. When the system is populated with a large number of devices relative to the number of available interrupts, ~~the interrupts are shared between devices which generates a high number of interrupts and devices which generate a lower number of interrupts~~ improved interrupt sharing is desirably achieved by causing a device which generates a large number of interrupt requests to share a common interrupt with a device which generates a lower number of interrupts.